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## CANBYITE, A NEW MINERAL

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### OCCURRENCE.

Some thirty-five or forty years ago, when the Brandywine Quarry at Wilmington, Delaware, was in operation, Mr. Fred Hilbiber, then living in that city, discovered in this quarry the minerals here described. The quarry is located a quarter mile northwest of the Baltimore and Ohio Railroad bridge on Brandywine Creek. It is at present used as a storage yard adjacent to a leather manufacturing plant.

The country rock is a gabbro, containing numerous quartz stringers and masses due to the effects of intrusive granite, and showing the minerals enumerated below. The minerals associated with the canbyite are as follows:

- Bornite: pure masses, iridescent, weighing altogether several pounds.
- Chalcopyrite: alone, and associated with bornite and pyrite.
- Chalcocite: associated with garnet and hisingerite.
- Pyrrhotite: narrow stringers associated with other sulphides.
- Pyrite: brilliant simple cubes, 1 to 3 mm. in diameter.
- Marcasite: coating surfaces of the rock, decomposing rapidly on exposure.
- Garnet: fibrous crystalline crusts associated with hisingerite.
- Apatite: bright crystals of a dark olive green color, showing prism, unit pyramid, and base; somewhat twisted and distorted by rock movements; embedded in quartz. Largest crystal observed,  $2 \times 5$  cm.
- Quartz: small crystals on gabbro, associated with calcite and stilbite.
- Calcite: white crystals, about  $3 \times 5$  mm. in size, terminated by  $r(10\bar{1}1)$ , showing also prominently  $M(40\bar{4}1)$  with a steep scalenohedron near  $(31\bar{4}2)$ . Also small unit rhombohedrons.
- Chabazite: well formed crystals, the largest observed being 0.8 cm. in diameter. Colors, dark olive green, salmon, dark brown to light brown.
- Natrolite: white and delicately acicular. Complete radiations, 2.2 cm. in diameter, crusts and veins. Associated with calcite, bornite and chalcopyrite, as are the other zeolites, which rest upon the sulphides.
- Stilbite: radiations 1.3 cm. in diameter, single crystals and sheaves 0.5 cm. in size; drusy surfaces; colors, gray-green, salmon, orange-yellow to white.

Laumontite: opaque, cream-colored crystals 0.5 cm. long, on gabbro. Sharp free crystals showing prism and base, which are today in a good state of preservation. Epidesmine: sheaf-like rosettes 1 mm. in diameter, composed of colorless, transparent crystals, associated with calcite and natrolite. Hisingerite: associated with canbyite, garnet, and sulphides.

The optical properties of the epidesmine correspond closely with those given for this mineral in E. S. Larsen's Tables; many of the associated minerals, however, are filled with microscopic inclusions of rectangular or rod-like shapes and brown color, which are inferred to be hisingerite, and which may be responsible for the abnormal refractive indices, particularly the low alpha index values, shown by the minerals at this locality.

#### ANALYSIS AND OPTICAL PROPERTIES.

The analysis indicates that the mineral is essentially a hydrated ferric silicate. While its composition can be practically duplicated by several published analyses of hisingerite, the present material is completely crystalline with definite optical properties, while hisingerite is a typically amorphous mineral and is always isotropic optically, or, at most, contains only rare, isolated and very minute birefracting grains. For this reason, and in consideration of several exhaustive treatments of the several groups of ferric silicate minerals which are awaiting publication, it seems most logical and less confusing to designate the present mineral by a distinct name. The name proposed is *canbyite*, in honor of the founder of the Natural History Society of Delaware, thru the courtesy of which society this mineral was made available for study.

Canbyite is thus a crystalline compound corresponding to the amorphous hisingerite, altho it seems improbable that it is the only crystalline ferric silicate corresponding in composition to the hisingerite group.

The canbyite occurs as a constituent of crusts which rest on a peculiar coarsely crystalline, translucent quartz having a bluish green color and greasy luster. The quartz contains scattered rhombic crystals of grayish feldspar, up to 2 cm. in diameter, crystals of pyroxene, and masses of chalcopyrite. The canbyite forms a platy dark brown layer from 1 to 2 mm. in thickness next to the quartz. This is immediately overlain by a fine columnar

layer of garnet, the minute columns of which stand perpendicular and terminate above in a minute druse of ill-defined crystals. The garnet is transparent and pale greenish brown under the microscope. It is completely isotropic with an index of refraction above 1.82. Above the garnet there is a layer from 1 to 10 mm., in thickness of sulphides, mainly chalcopyrite and chalcocite upon which rest bright cubes of pyrite. The pyrite crystals are overlain by a thick layer of amorphous hisingerite which was originally botryoidal but has been filled completely with minute contraction cracks. The hisingerite is clear golden brown under the microscope and is isotropic. Its index of refraction is variable, but the majority of the grains range between 1.45 and 1.47. A partial analysis of the hisingerite, made on only 0.0517 gram of material gave the following results:

## ANALYSIS OF HISINGERITE

	PER CENT	RATIOS	
SiO <sub>2</sub>	34.04	.56	.28×2
Fe <sub>2</sub> O <sub>3</sub>	45.84	.29	.29×1
H <sub>2</sub> O plus	9.09	.51	.26×2
H <sub>2</sub> O minus	9.67	.54	.27×2

The specimens from which the analyzed sample of canbyite was taken consisted of flat pieces of translucent greenish quartz coated on both sides with a platy layer 2 mm. or less thick, of the canbyite. The optical properties of this sample were worked out sufficiently to give a satisfactory knowledge of the character of the material analyzed. The sample was homogeneous, pure, and entirely crystalline. It has been impossible to obtain any subsequent samples which were not more or less contaminated with amorphous hisingerite. Under the microscope the material analyzed was coarsely crystalline, transparent, golden to amber brown and non-pleochroic. Certain flakes lie on the cleavage and show no traces of other cleavages and apparently show the emergence of the obtuse bisectrix perpendicular to the cleavage plate. Other grains whose orientation with reference to the cleavage was not determined give an acute biaxial figure with 2V very small, optically negative, dispersion perceptible,  $\rho > \nu(?)$ . A majority of the grains show the trace of a cleavage in their longest direction and the extinction is



parallel to this cleavage. Some grains show lines of dotted inclusions, in one grain intersecting the cleavage at an angle of  $18^\circ$ . The indices of refraction are decidedly variable, the average values for the analyzed sample being about  $\alpha = 1.562$ ,  $\beta = 1.580$ ,  $\gamma = 1.582$ . Subsequent samples showed a variation of the alpha index from 1.552 up to 1.595, although the other properties remain unchanged. This variation of the refractive index is apparently not due to varying water content as the index of a given sample remained unchanged when the sample was exposed alternately to very moist and extremely dry atmosphere. Most of the canbyite is more or less contaminated with grains of isotropic hisingerite although no hisingerite was present in the analyzed sample. As contrasted with the hisingerite analyzed above, this has in each case about the same index of refraction as the associated canbyite.

Only 0.2 gm. of material of satisfactory purity was available for quantitative analysis giving only a single portion. Water was determined by drying at  $110^\circ\text{C}$ . and loss on ignition. The analysis was carried out by the usual methods after fusing the carefully ignited mineral with sodium carbonate. The amount of material did not permit quantitative determination of the state of oxidation of the iron and manganese but qualitative tests for ferrous iron and manganic manganese gave negative results. The analysis (by Earl V. Shannon) gave the following results and ratios:—

## ANALYSIS OF CANBYITE

	PER CENT	RATIOS			
SiO <sub>2</sub>	32.85	.545	} .548	.091×1	1.01×6
TiO <sub>2</sub>	.26	.003			
Fe <sub>2</sub> O <sub>3</sub>	40.70	.255			
Al <sub>2</sub> O <sub>3</sub>	2.64	.026	} .281	.094×3	1.05×3
MnO	.74	.010			
CaO	1.50	.027			
MgO	2.05	.051	} .088	.088×1	.98×1
H <sub>2</sub> O above $110^\circ\text{C}$	7.90	.439			
H <sub>2</sub> O below $110^\circ\text{C}$ .	11.40	.633			
Total	100.04				

The formula may most simply be written by regarding the water given off above  $110^\circ\text{C}$ . as basic, and considering the miscellaneous small amounts of bivalent bases as occurring in replacement of this,

the formula then being,  $2\text{H}_2\text{O} \cdot \text{Fe}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O}$ , or  $\text{H}_4\text{Fe}^{\text{III}}_2\text{Si}_2\text{O}_9 \cdot 2\text{H}_2\text{O}$ . This formula requires the following composition:

$\text{SiO}_2$	34.23
$\text{Fe}_2\text{O}_3$	45.32
$\text{H}_2\text{O} +$	10.23
$\text{H}_2\text{O} -$	10.22
	<hr/> 100.00

## THE CRYSTALLOGRAPHIC WORK OF GUSTAVUS HINRICHS

CHARLES KEYES, *Des Moines, Iowa*

The recent demise of Dr. Gustavus Detlef Hinrichs, at the ripe age of four score and ten years, removes from our midst a rather unique personage in American mineralogy. His chief investigations date half a century ago, so that those of the present generation know personally little of his accomplishments.

Hinrichs was a mathematical crystallographer, ranking with the distinguished Haidinger of Vienna, and the great Klein of Berlin, and the only one this country ever produced. A pioneer of pioneers in what we now know as physical chemistry, his researches in this field were so many, so fundamental and so brilliant that one loses sight of the fact that he also did so much creditable work in mineralogy, meteorology and geology that in each of these fields his name will be long remembered.

Hinrichs' work on the structure of crystals had an unusual and especially broad prospect and an illuminating bearing on our modern concept of the atom. He early sought to show that the chemical nature of a substance found visible expression in its crystal form. His especial mission was the mathematical and crystallographic demonstration of the unity of matter, the foundation of which he designated as *Pantogen*.

Hinrichs was not so widely known among American scientists as he should have been. Most of his numerous publications were issued in Europe in languages other than English. This was due no doubt in large measure to early rebuff which he received in this country; and with a sensitive and high strung soul such as his the affair rankled in his breast to his dying day. In order to get his

new discoveries before the scientific public with as much expedition as possible, so that they might not be anticipated and their priority possibly questioned on account of the delay, he prepared a clear, concise summary of his views and sent it to the American Journal of Science where it was rejected rather unceremoniously. Not a single scientific journal or learned society would sponcer or publish this first brief outline.

Relation of the circumstances and the difficulties of getting his new thought before the world is curious commentary on our boasted progressiveness, but which is in reality our ataxic conservatism, a proneness every whit as repressive today as it was then. Long years afterwards Prof. J. D. Dana, of Yale University, editor of the American Journal of Science, at that time the foremost journal of its kind, seeing the great consideration with which the Hinrichs' memoirs were received in Europe, and recalling in some way his own strange gaucherie, wrote a long letter of apology for refusing him admission to the pages of the Journal, and excused himself on the grounds that he (Hinrichs) had been entirely too far ahead of the times.

At length despairing of having the memoir appear under the aegis of any American scientific society and not wishing to run risk of being supplanted through delay, Doctor Hinrichs prepared a concise résumé in French, in clear, bold characters, had it lithographed in Davenport, Iowa, and published it thus privately, in which form it was widely distributed. In marked contrast to its cold reception in this country it was given warmest acceptance in all the capitals of Europe, and especially in Paris, where the keen French mind was not slow in grasping the far-reaching significance of so novel and brilliant conception. So eulogistic were some of the members of the French Academy of Science that he was soon led to present his views more formally before that Institute. This summary was the first of a long series of memoirs, upwards of 60 in number, that were read before that body and printed in the *Comptes Rendus*; while more than a hundred others appeared in the *Moniteur Scientifique* of Paris. Elsewhere, in Austria, Denmark, Germany, and England, learned societies hastened to do him homage by electing him to membership.



Scientific achievements other than those in physical chemistry were attained chiefly while Professor Hinrichs was still a resident of Iowa, and while he held the chair of physical sciences in the State University. Although an expert mineralogist he made few contributions along the usual descriptive lines, except on the meteorites. On this last mentioned topic he went into considerable detail in an account of the great Iowa meteor of February 12, 1875, which was one of the most brilliant and notable phenomena of the kind ever witnessed in modern times, and which illuminated not only the whole State of Iowa, but the adjacent parts of Missouri, Illinois, Wisconsin and Minnesota. It was afterwards christened the Amana Fall; and the stones were distributed to many of the principal museums of the world. Accounts of this Fall were read before the French Academy of Sciences, attracting attention the world over.

Thoroughly original and important was Hinrichs' work on the crystallographic side of mineralogy. As a strictly mathematical crystallographer he belongs to the special coterie of the most distinguished men of this class. Notwithstanding the fact that it was among his first published works, his "Principles of Pure Crystallography" was a singularly erudite performance on the theoretical aspects of the subject; and the "Introduction to Crystallographic Chemistry" was incorporated in "Microscopical Chemical Analysis," a volume published by his son, Carl G., in 1894. More technical papers, chiefly read before the Vienna Academy of Sciences and published in the *Sitzungsberichte*, "On the Crystal Structure of Quartz," "the Statics of Crystal Symmetry," the "Chemico-Physical Reality of Rhombo-Tesseral Forms," etc., were thoroughly mathematical in treatment; but they reflected well the bent of his mind at this time, and the transcendent scope of some of his musings.

Partly through mathematical calculations, partly through results of chemical analyses, and partly through crystallographic construction of the atom Doctor Hinrichs not only demonstrated the unity of matter, but he showed that he could, from the primitive "atom," which he designated *Panatom*, build up any element, and further, if he could be supplied with a proper force, he could transform one element into another.

Possible or actual transmutation of base metal into precious metal is not really the important part of Hinrichs' researches, experiments and calculations. Discovery of the Philosopher's Stone is, of course, merely the romantic phase, the one that most appeals to an unthinking public. The modern and practical value is a far broader prospect. This is the establishment of the unity of matter. Surely this is making crystallography lift the veil of darkness and give insight into the nature of matter far beyond what mineralogists are accustomed to witness.

The pen of Doctor Hinrichs was as busy as his mind. The procession of his intellectual progeny spanned an interval of 75 years. Nearly half a hundred ponderous tomes attested the vigor and magnitude of his efforts and his tireless industry. Several hundreds of memoirs were published in the transactions of the learned societies. A majority of these appeared in Europe and in half a dozen languages. The 160 communications printed in Paris were already noted. Others were included in the publications of the scientific academies of Vienna, Berlin and Copenhagen. The complete bibliography of his works constituted one of the most imposing arrays of accomplishments ever produced in this country.

From a geological angle, a rather full biographical sketch of Doctor Hinrichs appeared in a recent volume of the *Pan-American Geologist*; and a complete bibliography of his writings in the several fields which he occupied will be printed in the forthcoming *Proceedings of the Iowa Academy of Sciences*.

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### FAMOUS MINERAL LOCALITIES: FURNACE CREEK, DEATH VALLEY

W. F. FOSHAG,<sup>1</sup> *United States National Museum*

The borax mines of Furnace Creek in the Death Valley region have been active for a number of years and are still the principal producers of borax in the United States. They are little visited by mineralogists, partly because of their comparative inaccessibility and partly because of the Pacific Coast Borax Company's policy to exclude all visitors and to allow no specimens to leave the mines.

<sup>1</sup> Published by permission of the Secretary of the Smithsonian Institution.



Permission to visit the deposits is seldom if ever granted and one can visit the mines only at the risk of being forcibly ejected. The deposits contain minerals of great scientific interest and such an attitude upon the part of any company is greatly to be deplored.

The deposits are separated into two districts; the Ryan District and the Mt. Blanco District. The Ryan District embraces the Biddy McCarthy, Widow, Lizzie V. Oakley, Lila C. and the Played-Out Mines. The Mt. Blanco deposits are not being exploited at present but are opened up by a number of exploration tunnels. As far as is known to the writer the mines of the Ryan District carry only colemanite, often in good crystals.

The localities can be reached only by auto, horse or burro. The most convenient route is by way of Shoshone, a station on the Tonopah and Tidewater Railroad. Hotel accommodations can be had here. From Shoshone the road passes over typical "desert" country to the Furnace Creek Wash and thence down the Wash to Ryan. Mt. Blanco is reached from Ryan by continuing down the Wash past The Tanks and taking the only road to the south leading into the clay hills flanking the Black Mountains on the north. The road leads directly to the deposits but the last mile must be made on foot. The distance from Shoshone to Mt. Blanco by this route is about 55 miles.

Another route is from Barstow to Cave Springs Wash by way of Garlic Springs to the south end of Death Valley, thence up Death Valley to Rhodes Wash, then taking the old Carbonate Mine Road back down the valley and thence up the Valley to Furnace Creek Ranch. This road is difficult of travel, over decidedly arid country and for a number of miles is below sea level and should not be attempted unless one is familiar with the region. Under no conditions should this route be taken in the summer months as the terrific heat and extremely low humidity is unbearable to all but the very hardiest. Ample supplies of water should be taken along on either route.

The Mt. Blanco deposits consist of ulexite, colemanite, inyoite, meyerhofferite and borax. The extremely rare mineral hydroboracite has also been found here. Many of the tunnels are in pure massive ulexite, partly fibrous, partly chalky.

The colemanite occurs in masses of great purity, very much honey-combed and containing large numbers of crystals that reflect the light of the candle from myriads of faces as one makes his way into the tunnels. The crystals are much smaller than those of the other districts, are prismatic in habit and generally yellowish from included buff colored clay.

The inyoite and meyerhofferite are always intimately associated. Pseudomorphs of meyerhofferite after inyoite crystals are often found. These are often 3 cm. or larger in size. The common type of meyerhofferite is parallel, reticulated masses. Another common type is radiated rosettes of closely packed needles in the cracks in calcareous shale. The inyoite forms glassy masses in the cracks in shale and also flat monoclinic crystals in the vugs. Colemanite, inyoite, meyerhofferite and ulexite all occur abundantly.

At the Russell Borax Mine, an independent producer, colemanite can be had, sometimes in groups of large crystals. One group from this mine in the United States National Museum is made up of crystals up to 12 cm. across. Nodular masses of colemanite can also be obtained here.

Near the Russell Mine, in the second small wash to the west a small prospect hole carries priceite in nodular masses in the shale. This is the only true "pandermite" (priceite) thus far found in California. The mineral ordinarily called pandermite in the borax districts is the silico-borate, howlite.

The boulders of andesitic lava about the Russell Mine and the flows to the south carry analcite in the amygdaloidal cavities. The analcite occurs in fine glassy crystals up to 1 cm. in size and makes attractive specimens. Natrolite is associated with it in radiating groups. To the south-east of the mine about 1 km. a basalt flow covers the shales unconformably and is especially rich in iddingsite.

Many of the colemanite specimens now in collections and labelled as from Death Valley come from the more accessible deposits in the Calico Hills near Barstow. This is especially true of the colemanite associated with the fine crystals of celestite.

PRICEITE FROM FURNACE CREEK, INYO COUNTY,  
CALIFORNIAW. F. FOSHAG,<sup>1</sup> *United States National Museum*

In the field and in the literature frequent mention is made of the occurrence of priceite in California. In the course of an investigation of the borax deposits of the Mohave Desert Region by the writer all the reported localities were visited. Invariably the priceite proved to be the calcium silicoborate, howlite. At the mines the howlite is generally referred to as pandermite (=priceite). True priceite, not hitherto reported, was found during this investigation at a small prospect in the Furnace Creek Wash in Inyo County, about two miles below the mill of the Pacific Coast Borax Company.

The priceite occurs as nodules and irregular masses embedded sporadically in a soft greenish gray shale. Near the surface the mineral is in soft chalky masses associated with colemanite and gypsum. With depth, the priceite becomes harder and more compact. The purest material is very compact and tough and breaks with a decided conchoidal fracture. The surface specimens resemble the priceite from Oregon while the more compact material is entirely similar to the mineral from Panderma. The color is pure white. Its hardness is 3–3.5. Sp. Gr. 2.43.

The compact mineral is crystalline to cryptocrystalline. The softer material under the microscope is seen to be made up of shreds and small platy grains with occasional rhombic outline. These grains have a weak birefringence, are biaxial with positive optical character and a medium optic axial angle. The indices determined by the immersion method are:

$$\alpha = 1.571, \beta = 1.590, \gamma = 1.593.$$

For analysis the compact, pure white material was selected. Although very fine grained the material appeared homogeneous under the microscope. The results of the analysis together with the calculated ratios is given below:

<sup>1</sup> Published by permission of the Secretary of the Smithsonian Institution.



## ANALYSIS AND RATIOS OF PRICEITE FROM CALIFORNIA

SiO <sub>2</sub>	0.58		
CaO	32.20	.575	5
Al <sub>2</sub> O <sub>3</sub>	0.20		
B <sub>2</sub> O <sub>3</sub>	49.03	.700	6
H <sub>2</sub> O (-)	0.38		
H <sub>2</sub> O (+)	17.86	.990	9
	100.25		

The ratios therefore correspond to the formula usually given for priceite,  $5\text{CaO} \cdot 6\text{B}_2\text{O}_3 \cdot 9\text{H}_2\text{O}$ . Van't Hoff, however assigned the formula  $4\text{CaO} \cdot 5\text{B}_2\text{O}_3 \cdot 7\text{H}_2\text{O}$  to the mineral, artificially prepared. In the following table the three best analyses are compared with the theoretical compositions of the two ratios given.

## COMPOSITION AND RATIOS OF PRICEITE

	4:5:7	5:6:9	Foshag	Van't Hoff	Kraut
CaO	32.7	32.5	32.2	31.4	32.3
B <sub>2</sub> O <sub>3</sub>	51.0	48.7	49.0	48.9	49.9
H <sub>2</sub> O	16.3	18.8	17.9	18.9	18.2

The agreement is sufficiently close to accept the ratios of priceite as  $5\text{CaO} \cdot 6\text{B}_2\text{O}_3 \cdot 9\text{H}_2\text{O}$ .

The minerals associated with the priceite are colemanite and gypsum. Both of these minerals were observed only in the specimens from the surface. The colemanite forms small crystals coating the sides of the cavities or attached to loose masses of the priceite in the cavities. In some places the priceite gives way to vugs lined with small and brilliant colemanite crystals. The relations indicate clearly that the colemanite is the result of the surface alteration of the priceite. The gypsum is decidedly later than the colemanite as well as the priceite. It forms seams in the shale and fills cavities occupied by the colemanite.

Van't Hoff synthesized priceite by the action of sodium and potassium chloride solutions upon ulexite at a boiling temperature. The Furnace Creek mineral, however, shows no evidence of having been derived from any preexisting mineral, but was probably deposited as priceite within the shales. In a recent paper by G. Linck,<sup>2</sup> the priceite of Panderma was thought to be a direct pre-

<sup>2</sup> *Centralblatt, Min. Geol.*, p. 193, 1923.

precipitation from the boraciferous waters of lagoons, the precipitate being first amorphous but crystallizing upon standing. The general occurrence and the metacolloidal character of the California mineral would seem to bear out such a hypothesis. The mineral is of very local occurrence, however, and probably formed under conditions somewhat different from those that determined the formation of the large beds of ulexite and colemanite of this region.

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## PROCEEDINGS OF SOCIETIES

### PHILADELPHIA MINERALOGICAL SOCIETY

*Academy of Natural Sciences, October 11, 1923*

A stated meeting of the Philadelphia Mineralogical Society was held on the above date, the President, Mr. Vaux, being in the chair. Fifteen members were present. The minutes of the previous meeting were read, corrected and then approved. Four names were proposed for membership. The matter of nomination of officers for the coming year having been overlooked at the preceding meeting, it was expressed as the sense of the society that the present officers be re-elected. On motion of Mr. Hoadley, seconded by Mr. Warford, and unanimously passed by the members, the Secretary cast a ballot re-electing the present officers for another term.

Mr. Biernbaum suggested that the order of business be amended so as to group together the routine business and provide for the uninterrupted consideration of subjects of mineralogical interest. Mr. Vaux heartily endorsed the suggestion and proposed a motion to make this change. The motion, duly seconded, was unanimously carried. Mr. Hoadley proposed that the Society consider the advisability of placing in the Mineral Hall of the Academy a loan collection to be supplied by the members of the Society. After some discussion, a motion was passed to create a committee to look into the matter and report to the Society the conclusions reached. The President appointed Messrs. Blank, Trudell and Biernbaum on this committee.

No further business being at hand, Mr. Boyle spoke on the subject "*The Miccas*." The ordinary physical characteristics of the principal members of this group were briefly referred to, their mode of occurrence, probable origin and associations were outlined and their general relationships stated. The chemical relationships were somewhat more fully explained with a view of presenting a synoptic study of the group, this being illustrated by blackboard presentation of the similarities and variations of chemical composition. The talk was also illustrated by specimens so displayed as to indicate the relationships shown by the chemical composition. Some discussion followed which evidenced the interest of the members in the subject.

The following trips were reported upon: by Mr. Hoadley, to Easton, Pa., Ogdensburg, N. J. and McAffee's near Franklin, N. J., which produced the usual minerals. Also a trip to Mantua and Mullica Hill, N. J., where well crystallized vivianite was found. On this latter trip, Dr. L. C. Wills and Mr. Boyle were present,

Dr. Wills serving as guide. By Mr. Biernbaum, to French Creek, participated in by eight other members on Sept. 29th and 30th. Good specimens of pyrite and magnetite were found, some being exhibited. On the return journey, a stop was made at the Wheatley Mine at Phoenixville, where some very promising microscopic material was found by Messrs. Boyle and Biernbaum. Mr. Vaux stated he had recently had the pleasure of seeing in the Parliament Buildings at Toronto, the exhibit of the Dept. of Mines of Ontario. Especially noteworthy were certain specimens of gold quartz and silver in calcite. The gold quartz occurs in veins exposed at the surface in the Porcupine District. The gold is distributed in lumps throughout the mass. The silver is from Cobalt, one specimen weighs approximately one and one-half tons and contains thousands of ounces of silver. The meeting adjourned at ten p.m.

J. C. BOYLE, *Secretary Pro Tem.*

### THE MINERALOGICAL SOCIETY OF WASHINGTON, D. C.

The Mineralogical Society of Washington held its third meeting as a field trip to the Springfield and Mineral Hill Mines in Carroll County, Maryland, on October 30th. Those taking part were Messrs. Burbank, Dunlop, Capps, Henderson, Hess, Katz, Loughlin, Reeves, C. P. Ross, C. S. Ross, Samson, Schrader, Spencer, and Steiger of the Geological Survey, Merwin, Washington, and Wyckoff of the Geophysical Laboratory, Foshag and Shannon of the National Museum, Wherry of the Bureau of Chemistry, Mr. Augustus Locke and Mr. Stickney.

The Springfield and Mineral Hill Mines are old iron mines that were worked many years ago. They are situated in a belt of rocks made up chiefly of mica schists with talc, actinolite and chlorite schists in lesser amounts. At the Springfield mine hematite schist is abundant, some of it approaching itabirite. At the Mineral Hill Mine the chief ore was magnetite. Sufficient chalcopryrite and bornite were encountered to work the mine for its copper. The chalcopryrite is intimately associated with a magnetite-hornblende rock, while the bornite occurs in lenses containing quartz, feldspar and epidote.

The dumps of the mine yielded abundant actinolite, talc, massive magnetite, scaly hematite and chlorite. Cobaltiferous gahnite was found in quartz lenses near the contact with schist and linneite in magnetite with chalcopryrite. Brochantite is rare as a secondary coating. Carrollite has also been reported from these mines. Some sulphides, possibly carrollite, were collected and will be investigated. The locality is interesting for its rocks and ores, but few mineral specimens of unusual merit can be found.

W. F. FOSHAG, *Secretary.*

### NEW YORK MINERALOGICAL CLUB

#### *Regular Monthly Meeting of October 10, 1923*

A regular meeting of the New York Mineralogical Club was held in the East Assembly Room of the American Museum of Natural History on Wednesday evening, October 10, at 8:15 p.m. In the temporary absence of the President, the Vice-President, Mr. George E. Ashby, presided at the opening of the meeting. There were 17 members present.

The minutes of the last meeting were read and approved. The Recording Secretary introduced for discussion the matter of a temporary loan collection repre-



senting the best specimens loaned by members of the Club to be exhibited in the Morgan Memorial Hall of the American Museum. After discussion it was moved that the President appoint a committee to arrange the details of this matter. Motion carried.

The following names were submitted to the Membership Committee: Mr. George D. Hurst, 38 West 61 Street, New York City; Mr. Fred C. Metcalfe, Box 51, Asbury Park, N. J.; Mr. Morris Blumenthal, 558 Quincy Street, Brooklyn. Proceeding to the main topic of the evening, *A Symposium on the Minerals Collected during the Summer*, Miss Catherine Schroeder exhibited several interesting gem specimens from South America including amethyst, aquamarine, tourmaline and topaz from Brazil, also some interesting and attractive water color paintings of localities in Brazil. Mr. Walther showed a number of specimens collected on the Club's Excursion to Bedford, May 30, also zeolites and other mineral specimens from the recent Great Notch excavation, and some fine prehnite on calcite from Paterson, N. J.

Mr. Hoadley described briefly a series of recent collecting trips in which 59 localities were visited and exhibited a number of specimens collected on these trips. The localities visited included Lenni, Duttons Mills, Liepersville, Springfield, French Creek, Holland (Feeney quarry), Edgehill, Frankford and Easton, Pennsylvania; Great Notch, Ogdensburg, Franklin, Ringwood, Mantua and Mullica Hill, New Jersey; Branchville, Danbury, the Redding localities, Roxbury, New Britain, Meriden, Portland, the Haddam localities, Farmington, Granby and Cobalt in Connecticut; and several localities in the vicinity of Keene, New Hampshire; also the Sterling and Bradley mines in Orange County, New York.

Mr. Manchester exhibited a very complete series of minerals from the new tunnel excavation at Little Falls, N. J. Mr. Schairer, a guest from Yale University, showed a specimen of topaz altered to margarite from Trumbull, Conn. Mr. Whitlock exhibited small fragments of the new mineral argento-jarosite from the Tintic District, Utah; a series showing the radio-active minerals from Katanga, Belgian Congo, as well as some of the copper minerals from the same locality including parsonsite; vanadinite and wulfenite from a new locality in Morocco; and some interesting twins of cerussite and pseudomorphs of cerussite after anglesite from a new locality in Tunisia.

The matter of the Field Excursion for Election Day was then introduced by the Chair. After some discussion as to the opinions of the members present, on a motion by Mr. Hoadley the localities at Ossining, N. Y. were selected and Messrs. Hoadley and Scott were selected as guides.

At this point the President, Dr. George F. Kunz, assumed the chair and appointed as a committee to arrange the matter of the loan collection, Messrs. Ashby, Hoadley, R. M. Allen and Whitlock. Mr. Collins showed some interesting photographs of the Bradley Mine, and Mr. Wintringham described the quarries in the vicinity of Caldwell, N. J. The meeting adjourned at 9:20 P.M.

HERBERT P. WHITLOCK, *Recording Secretary*

## BOOK REVIEW

CATALOGUE OF METEORITES, WITH SPECIAL REFERENCE TO THOSE REPRESENTED IN THE COLLECTION OF THE BRITISH MUSEUM (NATURAL HISTORY). G. T. PRIOR. *London, 1923*, x+196 pp. Price 10 s. Sold by British Museum, Cromwell Road, London, S. W. 7.

In this catalogue will be found, arranged alphabetically, the important data of 850 meteoritic falls, 193 of which are not represented in the British Museum. The information recorded includes in most instances the name by which the meteorite is generally known and its chief synonyms; the locality and date of fall; the weight and classificatory descriptive name; and references to the literature. The chemical analyses have been recalculated to express the percentage of nickeliferous iron, the ratio of Fe:Ni in the nickeliferous iron and the ratio of MgO:FeO in the magnesian silicates.

The system of classification adopted is that of Tschermak and Brezina as modified by Prior. Accordingly the three major divisions based on the relative amounts of nickeliferous iron and stony material are (a) Meteoric Irons or Siderites (b) Meteoric Stony-irons or Siderolites and (c) Meteoric Stones or Aerolites. This last division can be subdivided into (1) Chondritic Stones or Chondrites and (2) Non-chondritic Stones or Achondrites.

As this list includes the names of all meteorites known up to the end of 1922 the catalogue will serve as an extremely useful reference book.

W. F. H.

## NEW MINERALS: NEW SPECIES

CLASS: COLUMBATES, TITANATES, ETC. DIVISION: R'' : R''' + R'''' : H<sub>2</sub>O = 1 : 1 : 2

## Ellsworthite

T. L. WALKER and A. L. PARSONS: Ellsworthite and associated minerals from Hybla, Ontario. *Contrib. Canad. Min., 1923, Univ. Toronto Stud., Geol. Ser., 16*, 13-20, 1923.

NAME: In honor of Dr. H. V. Ellsworth of the Geological Survey of Canada.

CHEMICAL PROPERTIES: Formula approximately CaO.Cb<sub>2</sub>O<sub>5</sub>.2H<sub>2</sub>O or CaCb<sub>2</sub>O<sub>7</sub> (H<sub>2</sub>O)<sub>2</sub>. Considerable (UO<sub>2</sub>)'', some Fe, and traces of other elements replace Ca; considerable Ti, some Ta and Si, in some specimens U''''', and traces of others replace the Cb; there is also a little F present.

Two analyses by E. W. Todd gave for lighter and darker forms respectively: CaO 11.73, 13.62; MnO 0.43, 0.22; PbO 0.24, 0.41; Fe<sub>2</sub>O<sub>3</sub> 4.10, 3.80; Al<sub>2</sub>O<sub>3</sub> 0.42, none; rare earths 0.21, none; UO<sub>3</sub> 18.50, 10.68; Cb<sub>2</sub>O<sub>5</sub> 34.22, 34.27; Ta<sub>2</sub>O<sub>5</sub>, 4.32, 4.27; TiO<sub>2</sub> 10.47, 9.79; SnO<sub>2</sub> 0.10, 0.25; SiO<sub>2</sub> 2.54, 2.68; UO<sub>2</sub> none, 8.42; H<sub>2</sub>O 12.22, 11.42; F 0.22, 0.49; sums 99.72, 100.32%.

First (Cb, Ta) : (Ti, Sn, Si, U''''') = 3 : 4; (Ca, Mn, Pb) : (UO<sub>2</sub>)'' : (Fe, Al, r.e.) = 10 : 3 : 2.

Second (Cb, Ta) : (Ti, Sn, Si, U''''') = 2 : 3; (Ca, Mn, Pb) : (UO<sub>2</sub>)'' : (Fe, Al, r.e.) = 7 : 1 : 1.

PHYSICAL AND OPTICAL PROPERTIES: Color amber yellow in one variety, dark chocolate brown in the other. Luster adamantine. Form massive. Fracture small

conchoidal. Refractive index higher than 1.74; isotropic.  $H.=4$ ; sp. gr. (yellow) 3.608, (brown) 3.758.

**OCCURRENCE:** Imbedded in salmon-colored calcite and smoky quartz in pegmatite formerly worked for feldspar on Lot 18, Concession VII, Montecagle Township, Hastings County, Ontario.

**DISCUSSION:** Rather close to ampangabeite, but probably sufficiently distinct to be classed as an independent species.

According to the theory of atom for atom replacement on a volume basis in crystals, the interpretation of the columbate minerals is somewhat different from that usually adopted. Most of the early analyses have been so unsatisfactory that it hardly seemed worth while to apply this theory to them, but now that two accurate analyses made on optically controlled material, indicating a highly complex composition, are available, it may be attempted. Disregarding elements present in amounts less than 0.50%, the approximate volumes of the essential constituents of ellsworthite are, as estimated by averaging or interpolating in existing X-ray crystal structure data:

Ca	22	Cb	14	Si	7+
Fe	10	Ta	12	O	1
U	11	Ti	12	H <sub>2</sub> O	11

The two largest atoms, calcium and columbium, are obviously the dominant ones in the compound, and others replace them. The current ideas that  $Fe''$  and  $(UO_2)''$  replace Ca in the crystal (as they do in solution) are, however, believed open to question. There is little difficulty in tantalum or titanium, atom for atom, replacing columbium; and if, as seems probable, the volume of silicon in complex compounds is greater than that given (based on study of the adamantine form of the free element), it can likewise enter in this way. The oxygen atoms, being relatively very small, dispose themselves in various interspaces in the amount required by the valence relations, while the water groups may play one of several roles, without affecting the general interpretation of the compound.

Accepting the atom for atom replacement theory, the calculation of "molecular ratios" of a complex crystalline substance will differ from the procedure in the case of a compound in solution, in that the oxides in any one group used must contain corresponding numbers of the atoms other than oxygen; the dominant oxide in the present case being  $Cb_2O_5$ , its replacers are to be formulated as  $Fe_2O_3$ ,  $Si_2O_4$ ,  $Ti_2O_4$ ,  $U_2O_4$ ,  $Ta_2O_5$  and  $U_2O_6$ . The ratios of the essential constituents of the two forms of ellsworthite based on the analyses above quoted would then give the following:

Oxide	I			II		
	Wt.	%	Mol. ratios	%	Mol. ratios	
CaO	56.1	11.73	209 209 3	13.62	243 243 4	
$Cb_2O_5$	266.2	34.22	128	34.27	129	
$Fe_2O_3$	159.7	4.10	26	3.80	24	
$Si_2O_4$	120.2	2.54	21	2.68	22	
$Ti_2O_4$	160.0	10.47	65	9.79	61	291 5
$U_2O_4$	540.4	—	—	8.42	16	
$Ta_2O_5$	443.0	4.32	10	4.27	10	
$U_2O_6$	572.4	18.50	32	10.68	19	
H <sub>2</sub> O	18.0	12.22	679 679 10	11.42	634 634 11	



The formulas derived by this method,  $\text{Ca}_3\text{R}_8\text{O}_{39}(\text{H}_2\text{O})_{10}$  and  $\text{Ca}_4\text{R}_{10}\text{O}_{49}(\text{H}_2\text{O})_{11}$ , are rather complex, but there is no evidence that the columbo-titanates ever really approximate to simple compounds. E. T. W.

CLASS: SILICATES; SUB-CLASS, "META-SILICATES." DIVISION:  
 $\text{R}':\text{R}'':\text{R}''':\text{Si}=1:1:1:4.$

### Tuxtlite = Diopside-jadeite

HENRY S. WASHINGTON: The jade of the Tuxtla statuette. *Proc. U. S. Nat. Mus.*, **60**, No. 14, 12 pp.; The jades of middle America. *Proc. Nat. Acad. Sci.*, **8**, 319-326, 1922; this mineral p. 321.

NAME: After the locality, *Tuxtla*. Also termed diopside-jadeite, from the composition, a solid solution (?) of these two minerals.

CHEMICAL PROPERTIES: A combination of equal amounts of diopside and jadeite,  $\text{MgCaSi}_2\text{O}_6 + \text{NaAlSi}_2\text{O}_6$  or  $\text{NaMgCaAlSi}_4\text{O}_{12}$ ; theory  $\text{Na}_2\text{O}$  7.4,  $\text{MgO}$  9.6,  $\text{CaO}$  13.4,  $\text{Al}_2\text{O}_3$  12.2,  $\text{SiO}_2$  57.4, sum 100.0%. Analysis gave:  $\text{Na}_2\text{O}$  6.94,  $\text{K}_2\text{O}$  0.25,  $\text{MgO}$  8.72,  $\text{FeO}$  1.33,  $\text{CaO}$  12.76,  $\text{Al}_2\text{O}_3$  12.33,  $\text{Fe}_2\text{O}_3$  1.41,  $\text{MnO}$  0.05,  $\text{H}_2\text{O}$ —0.20,  $\text{H}_2\text{O}+0.10$ ,  $\text{Cr}_2\text{O}_3$ ,  $\text{TiO}_2$  none,  $\text{SiO}_2$  55.50, sum 99.59%. May be a solid solution of the one mineral in the other, or a double salt analogous to dolomite, etc.

PHYSICAL PROPERTIES: Color pea green; sp. gr. = 3.270;  $\text{H.}=6.5$ ; in thin section typical of the jadeite member of the pyroxenes.

OPTICAL PROPERTIES (Merwin): Homogeneous and uniform;  $\alpha=1.666$ ,  $\beta=1.674$ ,  $\gamma=1.688$ ,  $\gamma-\alpha=0.022$ . Optic axial angle about  $75^\circ$ ; sign +. Optic plane =  $b$ ,  $\alpha \wedge c = 45^\circ$ .

OCCURENCE: Known only in the Tuxtla statuette, plowed up near San Andrés de Tuxtla, Mexico; dates from about 96 B.C.

DISCUSSION: More study as to the nature of the solid solution relations seems called for, yet in view of the homogeneity and distinctive properties of the material, it may be accepted as a species. E. T. W.

### "Mayaite"

H. S. WASHINGTON, *loc. cit.*, p. 325.

NAME: After the *Maya* nation, which valued this material as a gem-stone.

DISCUSSION: A name proposed for the series of minerals composed of solid solutions of tuxtlite and albite in all proportions. This series is abundantly represented among Middle American "jade" objects, there being probably two sources of supply, one perhaps in Oaxaca, Mexico, the other in Guatemala. E. T. W.

CLASS: SILICATES; SUB-CLASS, HYDROUS ORTHO-SILICATES;  
 DIVISION  $\text{R}''':\text{Si}:\text{H}_2\text{O}=4:3:5.$

### Kochite

S. KōZU, K. SETO, and K. KINOSHITA: Studies on a new mineral, kochite. *J. Geol. Soc. Tokyo*, **29**, 1-16 (1922). S. KōZU and S. SAIKI: Dehydration of kochite in aqueous vapor at atmospheric pressure. *id.*, 148-154; through *Min. Abstr.* **2**, 51.

NAME: From the locality, *Kochi-mura*.

CHEMICAL PROPERTIES: Formula,  $2\text{Al}_2\text{O}_3.3\text{SiO}_2.5\text{H}_2\text{O}$  or  $\text{Al}_4(\text{SiO}_4)_3(\text{H}_2\text{O})_5.$

theory,  $\text{Al}_2\text{O}_3$  43.0,  $\text{SiO}_2$  38.0,  $\text{H}_2\text{O}$  19.0, sum 100.0%. Analysis gave:  $\text{Al}_2\text{O}_3$  44.13,  $\text{Fe}_2\text{O}_3$  none,  $\text{CaO}$  0.50,  $\text{MgO}$  0.08,  $\text{SiO}_2$  36.94,  $\text{TiO}_2$  0.05,  $\text{P}_2\text{O}_5$  trace,  $\text{H}_2\text{O}$  18.94, sum 100.64%. The  $\text{H}_2\text{O}$  is given off at 725-800° in air, 775-950° in aqueous vapor.

CRYSTALLOGRAPHIC PROPERTIES: *System*, isometric. Forms, (100) modified by (111).

PHYSICAL AND OPTICAL PROPERTIES: Color white. Habit, granular aggregate of crystals up to 0.05 mm. in diam. Sp. gr. (15°) = 2.929;  $n_D = 1.590$ .

OCCURRENCE: In Kōchi-mura, province of Rikuchu, Japan.

DISCUSSION: Appears to be a well marked new species. There is a possibility that it may represent a pseudomorph after some member of the gehlenite group (the crystals of which might be pheno-isometric) analogous to an alteration product from Orawitza, (Dana, *System*, p. 476 and 694) which has the same  $\text{Al}_2\text{O}_3:\text{SiO}_2$  ratio, and which being a colloid would be variable in  $\text{H}_2\text{O}$  content. E. T. W.

## ABSTRACTS: MINERALOGY

REALGAR. R. PILZ, R. SCHRÖDER, AND V. THOST. *Beitr. Kryst. Min.*, 1, 173-80, 1918; thru *Mineralog. Absts.*, 1, 343.

Realgar crystals rich in faces are described from Binnenthal, Felsö-Bánya, and China. Seventeen new forms are noted. The axial ratios are calculated as:

	$a:b:c$	$\beta$
Binnenthal	0.7207:1: .4859	66°15'
Felsö-Bánya	0.7205:1: .4855	66 15
Allchar (comparison)	0.7203:1: .4858	66 15.6

E. F. H.

PYRARGYRITE MULTIPLE TWINNING. O. B. BÖGGILD, V. GOLDSCHMIDT, AND R. SCHRÖDER. *Beitr. Kryst. Min.*, 2, 17-25, 1919; thru *Mineralog. Absts.*, 1, 344.

Complex cyclical groups are caused by multiple twinning on the plane  $u$  ( $10\bar{1}4$ ).

E. F. H.

FURTHER GROWTH OF ORTHOCLASE IN SOIL. O. MÜGGE. *Centr. Mineral.*, 1917, 121-3.

A new growth of orthoclase is recorded as occurring on fragments of the mineral found in soil near Carlsbad and in the Fichtelgebirge.

E. F. H.

THE SYMMETRY OF HALITE. V. ROSICKÝ. *Beitr. Kryst. Mineral.*, 1, 241-56, 1918; thru *Mineralog. Absts.*, 1, 306.

Cleavage blocks of pure halite were etched with concentrated NaCl solutions, containing 1-2% added  $\text{H}_2\text{O}$ ,  $\text{Na}_2\text{CO}_3$ , KCl, or HCl, etc. While the rectangular etch figures are usually parallel to cleavage edges, with added  $\text{H}_2\text{O}$  or  $\text{Na}_2\text{CO}_3$  they are turned thru 6-27°. This is interpreted to indicate gyrohedral symmetry.

E. F. H.

CRYSTALLOGRAPHIC OBSERVATIONS ON GYPSUM. V. ROSICKÝ. *Rozpravy České Akad. cl. 2*, 25, no. 13, 17pp. 1916; thru *Mineralog. Absts.*, 1, 311.

Natural etching on gypsum from Komořany, Bohemia, is similar to that

produced by HCl, but different from that with  $H_2SO_4$ . Another type of etch figure is produced by water and  $MgCl_2$  or KOH solutions. All are holohedral in character.

E. F. H.

NOTICE RELATIVE TO THE MINERALOGY OF RUSSIA. P. N. CHIRVINSKY. *Bull. Polytechn. Inst. Novocherkassk*, 7, sect. 2, 1-61, 1919; thru *Mineralog. Absts.*, 1, 327.

The following minerals are described: quartz, chalcedony, epidote, delessite, mesolite, stilbite, datolite, calcite, tripolite, travertine, apatite, orthoclase- and microcline-perthites.

E. F. H.

ALPINE MINERAL DEPOSITS. J. KOENIGSBERGER. *Abh. Bayer. Akad. Wiss., Math.-phys. Kl.* 28, no. 10, 25pp.; no. 11, 23pp.; no. 12, 108pp.; 1917-19; thru *Mineralog. Absts.*, 1, 328.

A list is given of 39 minerals with the forms shown by crystals of various habits; also a detailed account of the occurrence of crystallized minerals in rock-crevices of the Swiss Alps, from the view point of paragenesis and association; likewise a bibliography.

E. F. H.

THE ROCKS AND MINERALS OF THE CROYDON REGIONAL SURVEY. G. M. DAVIES. *Trans. Croydon Nat. Hist. Sci. Soc.* 8, 53-96, 1916; thru *Mineralog. Absts.*, 1, 328.

The mineral constituents of a large series of sedimentary rocks from east Surrey and west Kent are described. Among these are glauconite, allophane, cassiterite, corundum, and spinel.

E. F. H.

NEW MINERAL OCCURRENCES IN BOHEMIA. F. SLAVÍK. *Časopis Musea České*, 92, 38-42, 1918; 93, 28-32, 1919; thru *Mineralog. Absts.*, 1, 329.

Rhodochrosite, new for Bohemia, occurs in a deposit of Mn ores and pyrite at Chvaletice. Other brief notes on minerals of that country are included in the paper.

E. F. H.

TOPAZ FROM SCHLAGGENWALD, BOHEMIA. V. ROSICKÝ. *Rozpravy České Akad.*, cl. 2, 25, no. 7, 20 pp., 1916; thru *Mineralog. Absts.*, 1, 338.

Twenty-nine forms were recorded on topaz from Schlaggenwald, 9 are new for the locality, one (247) for the species. Sp. gr. 3.547. Anal.  $SiO_2$  32.38,  $Al_2O_3$  56.67, F 16.87,  $H_2O$  1.28, sum (less O) 100.10.  $\alpha_{Li} = 1.6117$ ,  $\alpha_{Na} = 1.6147$ ,  $\alpha_{Ti} = 1.6171$ ,  $\gamma_{Li} = 1.6216$ ,  $\gamma_{Na} = 1.6243$ ,  $\gamma_{Ti} = 1.6265$ .  $2E_{Na} = 116^\circ 12'$ .

E. F. H.

A STUDY OF DOLOMITES. C. L. HARDING, J. B. SHUMAKER, AND A. W. ROTHROCK. *Chem. News* 121, 50-2, (1920); THE COMPOSITION OF DOLOMITES. IRENE EVERMAN, O'NEAL MASON, AND GLENN BROWNING. *ibid.* 122, 109-10, (1921).

Analyses, with sp. gr. det'ns, of crystals and rocks from many localities are presented.

E. F. H.

RANCIEITE. J. O. HAAS. *Bull. soc. franc. min.*, 44, 95-8, 1921.

A new analysis of pure rancieite from Lacampe, in Villerouge and Albas, Aude, led to the formula  $MnO_2 \cdot 2MnO \cdot 2H_2O$ , with Mn'' partially replaced by Fe, Ca,  $Na_2$  and  $K_2$ . Sp. gr. 3.25-3.30.

E. F. H.



RADIUM BEARING PEGMATITES OF ONTARIO: H. V. ELLSWORTH. Summary Report, 1921, Part D, *Geological Survey, Department of Mines*, 20 pages, 2 figures, 2 prints.

Various rare earth localities are described, but that of lots 6-10, concessions IX and X of Conger township, Parry Sound, is the most interesting. Pegmatite dykes traversing granite were found carrying the rare mineral uraninite. This mineral, which occurs as isometric crystals or rounded grains varying from  $\frac{1}{8}$  to 1 inch, but mostly  $\frac{1}{4}$  inch or less in diameter, is found associated with quartz, feldspar, mica, spessartite, and possibly allanite. An analysis of this uraninite was conducted in duplicate and yielded the following results:  $\text{UO}_2$  53.63;  $\text{UO}_3$  26.32;  $\text{PbO}$  11.67;  $\text{ThO}_2$  3.22; yttrium group oxides 2.19; cerium group oxides 0.98;  $\text{CaO}$  0.41;  $(\text{Fe}_2\text{O}_3, \text{Al}_2\text{O}_3)$  0.17;  $\text{MnO}$  (present less than) 0.01;  $\text{SiO}_2$  0.29;  $\text{H}_2\text{O}$  0.72; insol. 0.13; magnesium, zirconium, bismuth, potassium and sodium oxides, doubtful traces; total 99.74. Sp. Gr. 9.116 at  $17.43^\circ\text{C}$ . EUG. PORTEVIN.

GERMANIUM. I. EXTRACTION FROM GERMANIUM-BEARING ZINC OXIDE. NON-OCCURRENCE IN SAMARSKITE. L. M. DENNIS AND JACOB PAPISH. *J. Amer. Chem. Soc.*, **43**, 2131-43, 1921.

A careful examination of American samarskite by a new method failed to reveal even a trace of Ge, though it had been reported to the amount of 1.5% by another chemist. E. F. H.

NOTE ON AUGITE FROM VESUVIUS AND ETNA. H. S. WASHINGTON AND H. E. MERWIN. *Am. J. Sci.* **1**, 20-30, (1921).

The Vesuvius augite: sp. gr. 3.242,  $\beta$  1.700-1.711,  $\text{SiO}_2$  47.60,  $\text{Al}_2\text{O}_3$  6.01,  $\text{Fe}_2\text{O}_3$  3.17,  $\text{FeO}$  4.59,  $\text{MgO}$  14.43,  $\text{CaO}$  21.52,  $\text{Na}_2\text{O}$  0.70,  $\text{K}_2\text{O}$  0.76,  $\text{H}_2\text{O} +$  0.08,  $\text{TiO}_2$  1.52,  $\text{MnO}$  0.13,  $\text{SrO}$  none, sum 100.51. From Monti Rossi, Etna: sp. gr. 3.373,  $\alpha$  1.704,  $\beta$  1.711,  $\gamma$  1.732,  $\text{SiO}_2$  50.09,  $\text{Al}_2\text{O}_3$  3.71,  $\text{Fe}_2\text{O}_3$  1.47,  $\text{FeO}$  4.96,  $\text{MgO}$  14.01,  $\text{CaO}$  22.48,  $\text{Na}_2\text{O}$  0.73,  $\text{K}_2\text{O}$  0.01,  $\text{H}_2\text{O} +$  0.22,  $\text{TiO}_2$  2.11,  $\text{MnO}$  0.21, sum 100.00 (corrected for 4% magnetite). E. F. H.

HAUSMANNITE IN THE BATESVILLE DISTRICT, ARKANSAS. H. D. MISER AND J. G. FAIRCHILD. *J. Wash. Acad. Sci.*, **10**(1), 1-8, 1920.

One of the principal ores of this district agrees in properties with the rare mineral hausmannite, which has been definitely identified in the U. S. only in California. It occurs in clay residual from a limestone, and it is intimately associated with psilomelane. One new property is noted, namely, that it is weakly but distinctly magnetic. Material for analysis was carefully selected, but subsequent study of polished surface showed the presence of psilomelane in grains and crack fillings too minute to be observed by a pocket lens on a rough fractured surface. Psilomelane is considered to be  $\text{Mn}_2\text{MnO}_5$  and the ratio of  $\text{MnO}$  to available oxygen is correspondingly 1.5, the corresponding ratio in hausmannite,  $\text{Mn}_3\text{O}_4$ , is 3. As the two analyses of the hausmannite given show ratios of 2.65 and 2.30, the first must have contained 13% psilomelane, the second 31%. Optical study by E. S. Larsen showed the finely crushed mineral to be reddish brown, nonpleochroic, and optically uniaxial, —, with  $\omega_{\text{Li}} = 2.45$  and  $\epsilon_{\text{Li}} = 2.15$ , both  $\pm 0.02$ ; this corresponds closely to data obtained on material from other localities. E. T. W.

THE CHEMICAL COMPOSITION OF HYDROTALCITE AND THE HYDROTALCITE GROUP OF MINERALS. WM. F. FOSHAG. *Proc. U. S. Nat. Museum* **58**, 147-53, (1921).

New analyses of hydrotalcite and stichtite are given. The general formula for the group is:  $\text{MgCO}_3.5\text{Mg}(\text{OH})_2.2\text{R}(\text{OH})_3.4\text{H}_2\text{O}$ . For hydrotalcite  $\text{R}=\text{Al}$ , stichtite  $\text{Cr}$ , pyroaurite  $\text{Fe}$ . The composition of brugnatellite remains in doubt. The first three are formed by the alteration of the corresponding members of the spinel group. The  $n$ 's are: hydrotalcite 1.510, pyroaurite 1.55, stichtite 1.542, brugnatellite 1.533. E. F. H.

ANALYSIS OF PARADOXITE FROM EUBA, SAXONY. WALTHER SCHÜLER. *Centr. Mineral.*, 1921, 737-8.

The mineral occurred with fluorite in quartz and porphyry veins. The forms present were (110), (101), and (001); sp. gr. 2.425-2.430. Analysis gave:  $\text{SiO}_2$  65.24,  $\text{Al}_2\text{O}_3$  17.73,  $\text{FeO}$  0.14,  $\text{Fe}_2\text{O}_3$  0.09,  $\text{K}_2\text{O}$  12.57,  $\text{Na}_2\text{O}$  1.05,  $\text{CaO}$  2.86,  $\text{MgO}$  0.24,  $\text{BaO}$  0.06,  $\text{SO}_2$  0.04,  $\text{F}$  trace, sum 100.02. It is practically a K-feldspar. E. F. H.

CONTRIBUTIONS TO THE CHEMICAL CONSTITUTION AND GENESIS OF THE NATURAL IRON SULFATES. X. R. SCHARIZER. *Z. Krist.* 56, 353-85, 1921.

Rhomboclase,  $(\text{FeOH})(\text{HSO}_4)_2$  is monoclinic,  $a:b:c=0.4633:1:0.7416$ ,  $\beta=89^\circ 6'$ ,  $\beta=1.551$ ,  $\gamma=1.650$ , opt. —, birefr. high. On heating in dry air both  $\text{H}_2\text{O}$  and  $\text{H}_2\text{SO}_4$  are given off, and the mineral passes finally to  $\text{Fe}_2\text{S}_3\text{O}_{12}$ , through two intermediate stages of hydration. When rhomboclase, coquimbite and copiapite are placed in funnels in a moist atmosphere, they absorb so much  $\text{H}_2\text{O}$  as to dissolve, and the resulting liquids seem to have definite compositions. The end-product towards which the hydrolysis of  $\text{Fe}'''$  sulfates tends is  $\text{Fe}_2\text{S}_2\text{O}_9$  (with  $7\text{H}_2\text{O}$  this is amarantite). The genesis of this series of sulfate minerals can now be worked out by definite reactions. On concentration of a dilute solution more and more  $\text{H}_2\text{SO}_4$  unites with  $\text{Fe}'''$ , forming the three minerals successively or together. E. T. W.

THE SPECTROSCOPIC ANALYSIS FOR BORON, AND ITS PRESENCE IN SEVERAL NATURAL ALUMINUM SILICATES. A. LACROIX AND A. DE GRAMONT. *Bull. soc. franc. min.*, 44, 67-77, 1921.

A spectroscopic examination of the flames of sodium carbonate fusions of certain aluminum silicates showed the presence of boron. This was in several cases confirmed quantitatively. Dumortierite from Soavina, Madagascar contained 5.00%  $\text{B}_2\text{O}_3$ ; idocrase from the Pic de Péguères in the Pyrenees, 0.63%. Negative results were obtained with some idocrases, and with andalusite, sillimanite, cyanite, topaz, corundum, diaspore, hydrargyllite, staurolite, prehnite, cordierite, pollucite, ilvaite, and euclase. Sapphirine and kornorupine from Itrongay, and grandidierite from Andrahomana, all in Madagascar, contained respectively 0.75, 3.59, and 2.81%  $\text{B}_2\text{O}_3$ , and the complete analyses led to the following new formulae:—Sapphirine,  $9\text{MgO}.10(\text{Al}, \text{Fe}, \text{B})_2\text{O}_3.4\text{SiO}_2$ ; Grandidierite,  $2\text{Na}_2\text{O}.4\text{FeO}.8(\text{Al}, \text{Fe}, \text{B})_2\text{O}_3.5\text{SiO}_2$ ; and Kornorupine,  $\text{Mg}_8[(\text{Al}, \text{Fe}, \text{B})\text{O}]_{12}(\text{SiO}_4)_7$ . E. F. H.

THE SPECTRUM OF SILICATE MINERALS FUSED WITH SALTS, PRINCIPALLY IN THE ULTRA-VIOLET. A. de GRAMONT. *Bull. soc. franc. min.*, 44, 77-95, 1921.

G. gives the position and intensity of the lines for the principal constituents of the silicate minerals and the impurities introduced in the fusion and manipulation. E. F. H.